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Iron as a precursor of aggregation and a vector of organic carbon to the sediment

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During the last decades, terrestrial loading of dissolved organic carbon (DOC) to northern freshwaters has increased dramatically, observed as a browning of the water, with consequences for the biogeochemical fate of OC. A more recent finding is that also iron (Fe) concentrations are on the rise. Fe has the capacity to influence key processes that are decisive to the fate of OC in aquatic systems. These processes include photochemical transformations, aggregation of dissolved OC into particles, and preservation of OC in sediments by means of a "rusty carbon sink". Nevertheless, we are only beginning to understand the quantitative importance and the mechanisms by which Fe influences OC transformations and loss processes in freshwaters. The aim of this study is to investigate how interactions between Fe and OC affect their biogeochemical cycling in boreal lakes with a particular focus on understanding the role of Fe as a precursor of aggregation and a vector of OC to the sediments. We used Lake Bolmen in Sweden as a study system. The basic approach was to sample Fe and OC – in the water column, in sinking material and in sediments – along a gradient of increasing distance from the main inlet, corresponding to increasing water residence time. Aqueous Fe and OC concentrations, sinking and accumulation rates in sediments, and a detailed characterization of Fe speciation (XAS) and the composition of organic matter (IR and NMR) reveal how interactions with Fe affects the fate of OC within the lake.

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IRON AS A PRECURSOR OF AGGREGATION AND A VECTOR OF ORGANIC CARBON TO THE SEDIMENT

Scientific Sessions > SS052
Microbial and Abiotic Factors
Influencing the Turnover and Fate of Organic Matter in Aquatic Systems

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